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RADIO - TELEPHONE VOX

by

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Final Report

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Radio-Telephone Vox system provides a radio-wire integration arrangement which does not require a dedicated operator. The Voice Operated Switch (VOX) is unique because, in contrast with existing systems, it is not actuated by either random or systematic ambient noise. It responds only to voice sounds. The present system was evaluated by using it to interface the AN/PRC-77 Tactical Radio and a Field Telephone, TA-312/PT, using field communications wire WD-1 between the radio and the telephone. (Con't on reverse)		

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BLOCK 20. ABSTRACT CONT.

Prototype development and Engineering/Operational Testing are recommended.

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INTRODUCTION

For several years the need for a Voice Operated Switch (VOX) to be used in conjunction with Military Communications equipment has been recognized. Among the advantages offered by VOX operation is hands free operation of the communications device. Existing VOX devices usually are operated by all sounds within the audio portion of the spectrum and are thus susceptible to actuation by either random or repetitive noise such as gunfire, typewriters or other ambient sources. Investigation revealed that VOX type control devices which respond only to voice sounds had been developed by two companies. One device, the Noise Immune Switch (NIX) developed by the Xetron Corporation, was originally designed to reduce the effect of non-voice sounds for hearing aids. The other system, developed by Westinghouse Electric Corporation, is called Voice Operated Simplex Adapter (VOSA) and was originally designed for use in noisy aircraft environments. Two models of each system were modified to control the AN/PRC-77 tactical radio from a telephone wire pair, such as WD-1, using a TA-312/PT field telephone as the terminal. Although both the NIX and the VOSA accomplish a similar result, the circuit designs are quite different, and the evaluation was to determine which system best satisfies the requirement.

SYSTEM DESCRIPTION

The NIX "F" system (Figure 1) consists of a control unit which attaches to the carrying handle of the AN/PRC-77 Tactical Radio. A plug connects the NIX to the power connector of the radio. A pair of binding posts are used for the connection to the telephone line. The NIX device is 5" x 3" x 1½" overall and weighs 1 lb 4 oz. It uses power from the PRC-77 Battery. An acoustic coupler is also included as a separate component. This permits the use of a commercial telephone system to control the radio without physical connection to the telephone line. The coupler is 12" x 8" x 3" and weighs about 4 lbs with 4 self-contained BA-30 Batteries (D cells).

The VOSA 1-D system (Figure 2) consists of a control unit which is 12" x 12" x 2" and weighs 3 lbs 14 oz without battery. It connects to the power plug of the AN/PRC-77 and requires an external source of 28 volts DC. Binding posts are provided to allow connection of the telephone line and the external battery.

The NIX "F" has been reduced to nearly the final configuration expected for field application. The VOSA 1-D is in "Brass Board" form and would require redesign to operate from the radio internal battery. The VOSA could be reduced significantly in size.

These systems are similar in function with the primary purpose to provide control of a remotely located radio by use of a telephone line such as WD-1 combat wire. In use with military field telephones, one end of the telephone line connects to the Radio-Telephone VOX device attached to the radio. The other end of the telephone line connects to a telephone instrument such as the TA 312/PT. The operator at the telephone is able to listen to the radio with his hand set and also transmit over the radio by depressing the hand switch and talking. As soon as the operator stops talking the radio reverts to the receive condition. Both systems employ special filtering techniques so that only voice signals, not ambient noise, control the operation of the radio. The equipment obtained from the manufacturers was for feasibility evaluation. It had not been environmentally packaged.

The acoustic coupler provides an added capability which allows the use of a commercial telephone to operate the NIX switch without having to make a physical wire connection to the phone system. The user places the hand set on the coupler after placing the call. The person at the other end of the phone connection may then operate the radio as previously described. At the conclusion of the communication the hand set must be removed from the coupler and placed on the regular cradle or hook manually.

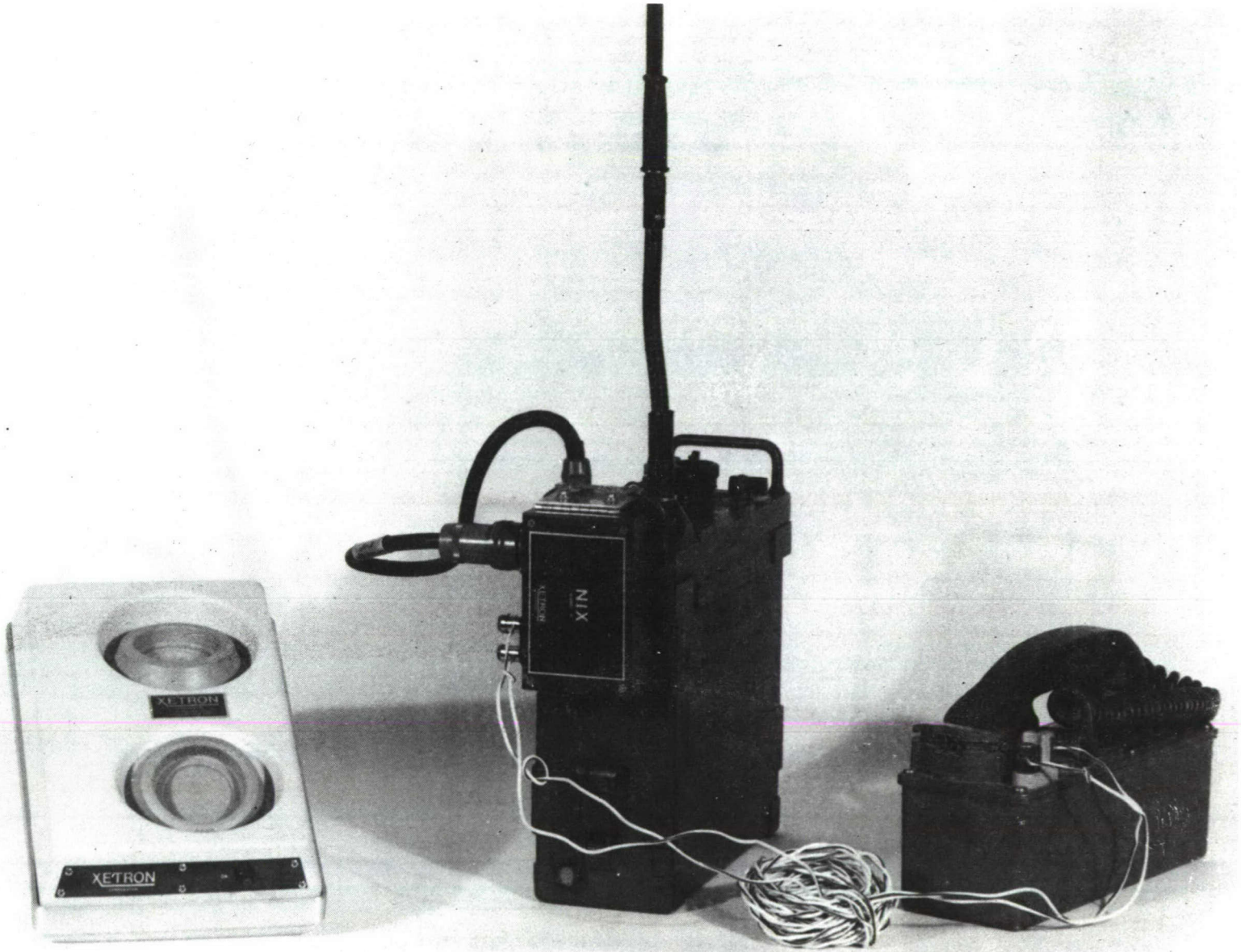

Figure 1. NIX Model "F" System

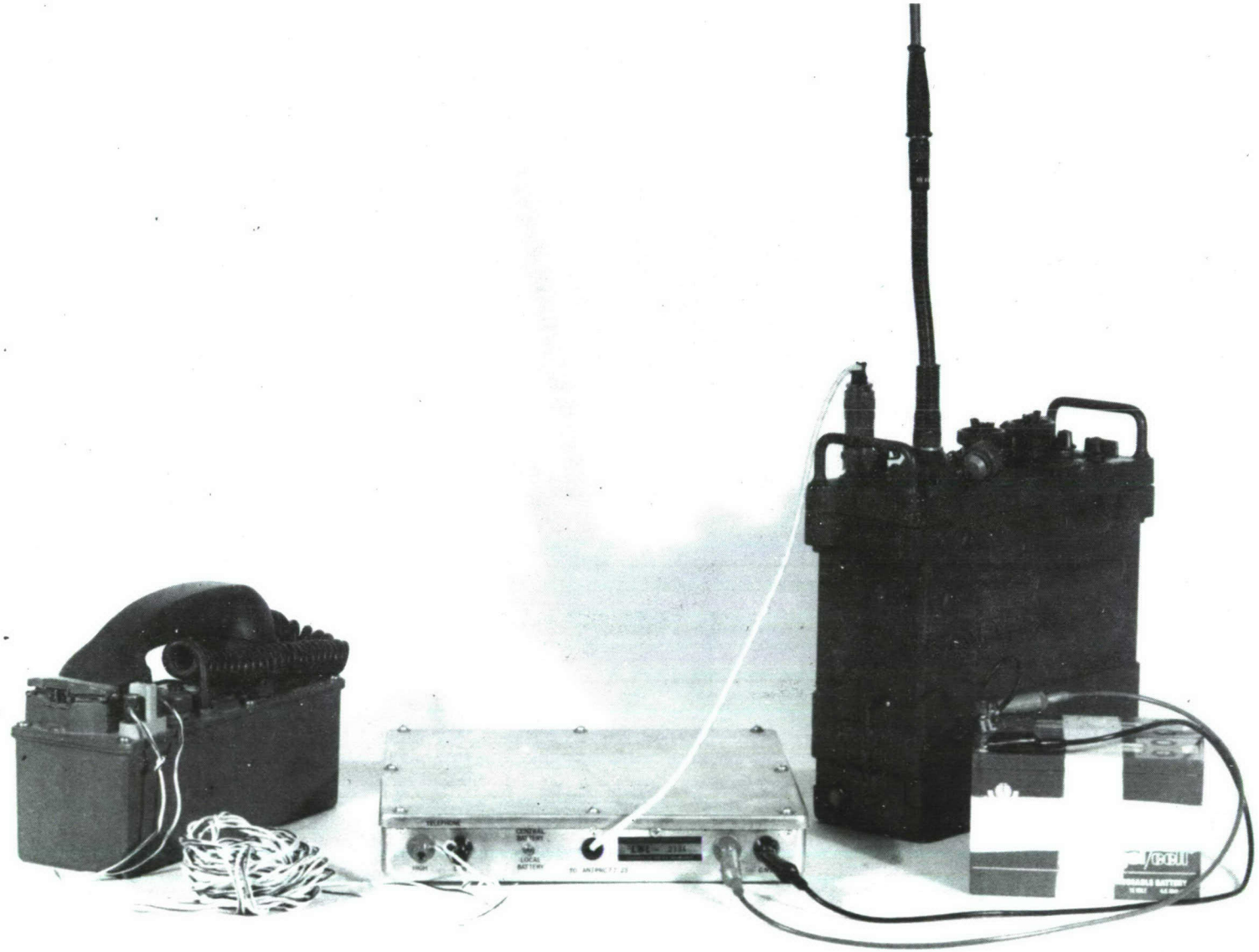

Figure 2. VOSA Model 1-D System

TEST PROCEDURES & RESULTS

Both systems were tested at LWL under laboratory conditions using AN/PRC-77 tactical radios and TA-312 telephone units. The units were opersted with the handset of the TA-312 in close proximity to a typewriter in use. In the past, this had been found to be an especially stringent test of voice-selective filtering devices.

At all times, both systems rejected noise sources and responded only to voice signals. It was noticed that a loss of the first syllable of speech occurred during transmission. This was found to result from the normal delays of a few hundred milliseconds designed into the AN/PRC-77. The minimal effect on information transmission can be avoided by proper operating discipline. During the tests, it was noted that the VOSA system showed some sensitivity to radio frequency interference (RFI) from nearby PRC-77 radios. It appears that the difficulty is not a serious one and could be eliminated by simple improvements in shielding and/or filtering.

Subsequently, the NIX system was demonstrated to personnel of the SE Signal School at Fort Gordon, GA. During this demonstration "white noise" from an external source was injected into the phone line in an attempt to trigger the VOX circuits. The system did not respond to the noise until its amplitude was increased sufficiently to obscure normal telephone voice communications. The NIX systems were left with the Signal School for further evaluation.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. Both systems achieve the desired Radio-Wire integration without the use of a dedicated operator.

2. Ordinary military or commercial telephone lines of several miles long, can be used to operate the Tactical Radio from a remote location.

3. The VOX operation is not affected by random or periodic audio noises. However, one of the systems showed some sensitivity to RFI.

Recommendations

1. The Parent Agency, US Army Electronics Command, FT Monmouth, NJ AMSEL-NL-N-3, should perform complete tests to determine which of the systems best fulfills the need.

2. Hardened versions of the system (s) should be developed for Engineering/Operational tests.

3. The systems should be evaluated with a variety of tactical radio equipments.

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